

TAXONOMIC AND BIOLOGICAL OBSERVATIONS ON
PSEUDEXENTERA HABROSANA (HEINRICH)

(Lepidoptera: Tortricidae)

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This Olethreutid moth has remained unrecognized since its original description, although it is to be found as a rather common associate of live oak in California, flying primarily in January, February and March. It has been undetermined in collections or confused with *P. oregonana* (Walsingham).

PSEUDEXENTERA HABROSANA (Heinrich), new combination
Exentera habrosama Heinrich, 1923, Bull. U.S. Nat'l. Mus., 123:178.

Heinrich (1940) has shown that the type of *Exentera* is a synonym of a species of *Eucosma*, and accordingly he proposed the name *Pseudexentera* for species formerly assigned to *Exentera* which are congeneric with *cressoniana* (Clemens). The latter was thought by Heinrich to be a synonym of *improbana* (Walker), but subsequently McDunnough (1959) presented evidence that Walker's name probably is not congeneric with *cressoniana*. He raised the latter from synonymy to accommodate the common eastern oak-feeding species.

P. oregonana (Walsingham) was described from northern Oregon in 1879, and the name subsequently has been identified with a widespread, poplar-feeding species in Canada. Although the male genitalic characters used are very similar between the species, McDunnough (1940) showed that the female genitalia are of taxonomic value in the group and can be used to separate *oregonana* and *cressoniana*.

P. habrosana (Heinrich) was described from three males, two from San Diego and one from San Francisco, California. The original description does not clearly point out some of the distinctive features; and, although Heinrich indicated some variation in wing pattern, *P. habrosana* is variable to a much greater extent. The species may be characterized as follows.

A narrow-winged species having grey forewings which are marked by a distinct, mid-dorsal, dark, vertical bar and have a bronzy mottling in the terminal area.

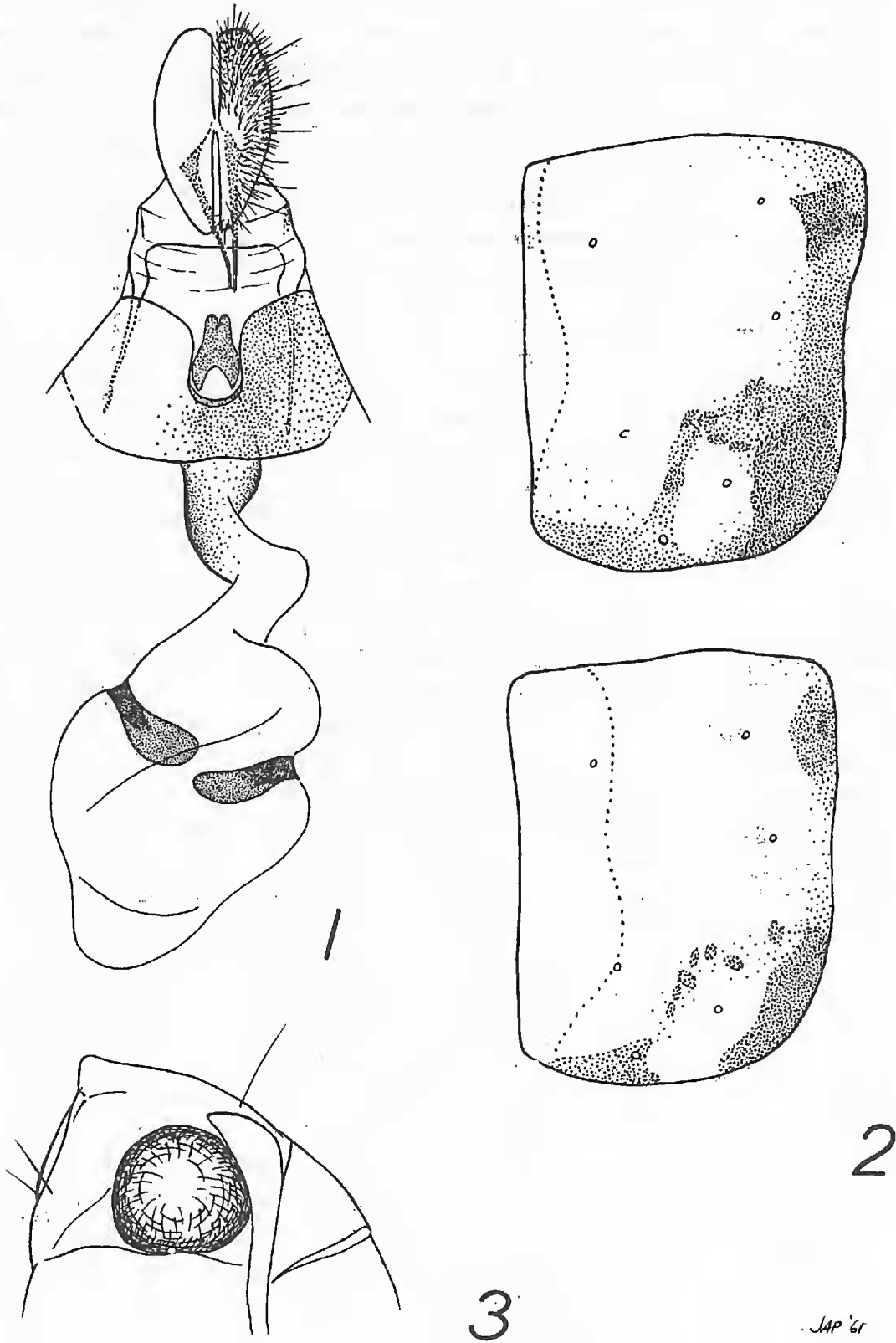
Male.—Length of forewing 8.7 to 10.5 mm. *Head*: labial palpus elongate, second segment longer than vertical eye diameter, curving upward, broadly expanded by spreading scales into a rounded tuft which half obscures the

porrect, smooth-scaled third segment; second segment grey exteriorly, at times reflecting purplish, the scales narrowly tipped with white, paler interiorly; third segment dark grey. Antenna dark grey, dorsal scaling spreading, giving a dentate appearance; scape white below. Scale tufts of crown strongly directed inward, of vertex forward, scales elongate, grey, their bifid tips narrowly whitish. *Thorax*: scaling appressed, greyish, scales white-tipped, more broadly so posteriorly; metanotum scaled, lateral tufts not extending over scutellum. Underside shining white; pro- and mesothoracic legs greyish. *Forewing*: elongate, length about 3.7 times width, expanding outwardly. Costa nearly straight; apex acute; termen strongly angled back, slightly concave below middle, broadly curved to dorsum. Ground color grey; a black, vertical bar at inner one-third of dorsum. its inner margin usually indistinct, with a straight or concave outer margin, or the whole mark curving outwards towards middle of wing; a bronzy suffusion present, usually as a few scales in the dorsal bar and an indistinct shading in apical area; outer half of wing suffused with whitish, at times forming a distinct pattern, leaving bronzy or blackish markings as follows: a broad band from costa beyond middle to tornus, sinuate on both inner and outer margins; apical area from outer one-fourth of costa to mid-termen, with a rounded intrusion of whitish below middle and interrupted by the outer two of four pairs of white costal dashes. Fringe grey, darker in apical area and at tornus, the scales distinctly tipped with white. Underside dark grey, reflecting purplish, costa with four distinct or indistinct white areas corresponding to costal dash marks of upperside. *Hindwing*: one-third broader than forewing; costa slightly concave in outer half; apex acute; termen almost straight; dorsum slightly concave. Pale brownish or greyish, darker towards apical area. Fringe broad, white with a basal row of short, pale brownish scales. Underside pale brownish to whitish, at times streaked with white. Fringe white. *Abdomen*: whitish to pale greyish, each segment broadly banded with shining whitish posteriorly. Genital tuft short, not spreading; genitalia as figured by Heinrich (1923; fig. 314) (four preparations examined).

Female.—Length of forewing 7.4 to 9.5 mm. Essentially as described for male in external features. Variation as great, although the distinctly marked form apparently less frequent in female. Genital tuft reduced, papillae anales exposed; genitalia as in fig. 1 (drawn from neallotype, Mill Valley, II-7-26, JAP Prep. No. 594, five preparations examined); small plate of antrum somewhat variable in development; corpus bursae covered with minute spiculae, densest in central portion (not indicated in figure 1).

The genitalia of both sexes are very similar to *P. oregonana* (Walsingham) as figured by Heinrich (1923) and McDunnough (1940). From the description it does not seem likely that Walsingham's species is conspecific with the *habrosana* material examined, since Walsingham made no mention of the dark dorsal bar which seems to distinguish *habrosana*. Additional material from Oregon and northern California may reveal that the two are races of the same species. However, if *oregonana* has been correctly identified

in Canada, the two have different foodplants, *habrosana*, being an oak-feeder.



EXPLANATION OF FIGURES

Figs. 1-3; *Pseudexentera habrosana* (Heinrich). 1; female genitalia, ventral aspect. 2; prothoracic shields of two larvae showing variation in marking; dotted line indicates approximate extent of yellow-brown coloration. 3; pupal head; lateral aspect, showing frontal projection.

The remarkable distinctly marked form described above at times appears to be represented in local colonies (e.g., Alpine Lake), but frequently it is taken along with examples of the diffuse-marked forms (e.g., The Geysers). The two at first appear to be distinct species, but I have been unable to find any consistent superficial or genitalic difference between them. Heinrich described the dorsal band as "brownish ochreous, outwardly curved", but there is a complete gradation from a vertical outer margin to a strong outward curve and from black to dark bronzy. The bronzy, curving bar is characteristic of the distinctly marked form.

California material examined.—Nevada Co.: Nevada City, 1 ♂ VI-'53 (E. C. Zimmerman). Placer Co.: Colfax, 1 ♀ "April" (A. H. Vachell). Sonoma Co.: The Geysers, 1 ♂ III-19-39, 3 ♂ II-4-40 (E. C. Johnston); Spring Mtn., 1 ♂ II-26-61 (J. Powell); Kenwood, 1 ♂ II-14-31 (E. C. Johnston); Petaluma, 1 ♀ II-17-39 (E. C. Johnston). Napa Co.: Spring Mt., 3 ♂ I-14-40, 3 ♂ I-26-40, 2 ♂ II-1-40, 1 ♂ III-1-40, 1 ♀ IV-2-50 (E. C. Johnston). Marin Co.: Tomales Bay St. Park, 4 ♂ I-21-59 (J. Powell); Inverness, 1 ♂ I-28-40 (E. C. Johnston), 1 ♂ II-17-61 (J. Powell); Phoenix Lake, 1 ♀ III-6-26, 1 ♀ III-19-27 (H. H. Keifer); Alpine Lake, 3 ♂, 1 ♀ IV-1-59 (J. M. Burns); Mill Valley, 2 ♂ I-21-25 (H. H. Keifer), 8 ♂, 6 ♀ II-7 to II-28-26 (E. P. & M. C. Van Duzee), 1 ♂ III-5-59, light trap (H. B. Leech). Contra Costa Co.: Orinda, 1 ♂, 4 ♀ II-5-61, 15 watt blacklight trap (W. W. Allen); Bollinger Cnyn. Rd., 1 ♂ II-14-60 (J. Powell). Alameda Co.: Berkeley, 1 ♀ II-29-60, at light (J. Powell); Strawberry Cnyn., Berkeley Hills, 1 ♀ III-4-59 (Chemsak & Powell), 1 ♂ II-21-60, 1 ♂, 2 ♀ IV-16-60, r. f. *Quercus agrifolia* (dead adults in pupal shells III-'61) (JAP-60D7), 1 ♂ I-27-61, on lvs. *Q. agrifolia* (J. Powell); Mills College, Oakland, 2 ♀ II-9-08 (A. F. Braun). San Francisco Co.: San Francisco, 2 ♂ II-8-26, 1 ♂ r.f. *Q. agrifolia*, IX-4-27 (H. H. Keifer), 1 ♂ II-17-60, "flying nr. *Q. agrifolia*," 1 ♂ II-18-60 (P. H. Arnaud, Jr.), Golden Gate Park, 3 ♀ III-18-60, *Q. agrifolia* assoc. (J. Powell). Santa Clara Co.: Stanford Univ., 1 ♀ III-1-48, "collected on oak" (J. W. Tilden). Monterey Co.: Carmel, 2 ♂, 2 ♀ "IV" (A. H. Vachell), 1 ♂ II-9-38 (L. S. Slevin); Hasting's Reservation nr. Jamesburg, 1 ♂ II-5-53 (Linsdale), 1 ♀ III-7-54, 1 ♂ III-9-54, at light (B. S. Davis). Los Angeles Co.: Tanbark Flat, 2 ♂ III-30-57 (J. Powell). San Diego Co.: Oak Grove, 1 ♂, 1 ♀ IV-4-49 (P. D. Hurd); San Diego, 1 ♂ III-18-12 (W. S. Wright), Paratype.

Biology.—It seems likely that the life history of *P. habrosana* is similar to that described for eastern members of the genus by Freeman (1942) and McDunnough (1959). The moths of these species fly in early spring, just before the leaf buds of their respective hosts open, at which time the females oviposit on the terminal twigs. The larvae feed on new spring growth, then enter the soil, where they spin oval, brown cocoons and aestivate. Pupa-tion occurs in the fall, and the pupae hibernate. In the San Fran-

cisco Bay area, *P. habrosana* has been collected on a number of occasions in association with *Quercus agrifolia*, and larvae were taken on this plant in April 1960. *Q. agrifolia*, an evergreen species, begins to send out new growth during March in the bay area, at about the end of the flight period of *P. habrosana* in this region.

Full grown larvae were taken only in small numbers in large collections of the spring caterpillar community on the trees, and no special shelter construction or feeding habits were noted. The *P. habrosana* larvae are pale tan and very sluggish in behavior. Aestivation commenced soon, the larvae constructing tightly-spun, flat cocoons between bits of leaf material and the paper toweling provided in the bottom of the container. The cocoons were kept under laboratory conditions; and when examined in early August, the larvae had not pupated, but did so later. The adults failed to emerge during early spring 1961, presumably due to dessication. (Confirmation of the identification was made from the genitalia of a fully developed adult dissected from the pupal shell.)

McDunnough (1959) states that adults of *P. kalmiana* McD. are fully formed in the fall but that attempts to rear them prove futile because the moths frequently dry up in the pupal shell during winter. This probably accounts both for the fall emergence date of the San Francisco rearing record given above and for the paucity of rearing records in general.

The larva of *P. habrosana* is distinct from the five species of *Pseudexentera* described by MacKay (1959) in having fewer crotchets, and differs from each in other details. In her key it runs to *Pseudexentera* sp. (? *oregonana*) due to the stout spinneret. The following diagnosis of the larva is based on four specimens collected April 16, 1960 in Strawberry Canyon on *Quercus agrifolia* (JAP-60D7).

Ultimate instar.—As characterized for *Pseudexentera* by MacKay (1959) except as follows:

Length about 13.5–14.0 mm. (specimens distended in KAAD). Head, average width at vertex 1.21 mm., average greatest length (as seen from above) 1.01 mm.; outline in dorsal view not broadly rounded; yellow-brown, at times quite pale, somewhat darker posteriorly and at sides; ocellar area black. Spinneret about 4.5 to 5 times longer than broad. Body pale, integument including pinaculi without pigment; no spinules evident under 100x magnification. Prothoracic shield pale yellow-brown, distinctly and rather consistently marked with dark brown sclerotization as in fig. 2; spiracle small (about equal to distance between setae L_2 and L_1). Setal

arrangements essentially as figured by MacKay for other species in the genus; on prothorax, SD_1 usually closer to SD_2 than to XD_2 but nearer to latter in one case; L_1 distinctly to slightly closer to L_2 than to L_3 and slightly below a line connecting the latter two; on abdomen, SD_1 of segment 8 anterior or slightly anteroventral of spiracle and about two times diameter of latter from it; SV group on segments 1, 2, 7, 8, 9 usually 3:3:2:2:2 (3:3:1:2:1 on one side of one specimen). Anal shield rounded posteriorly; setae L_1 further apart than D_1 ; D_2 less than one-third the length of L_1 . Anal comb moderately well developed, usually with four teeth (5 + 2 small, anterobasal teeth on one specimen). Tarsi brown. Crotchets biordinal or partially triordinal; usually 31 (range 29–34) on abdominal proleg; about 22 (range 20–24) on anal proleg.

The pupa is provided with a pointed frontal projection (fig. 3), which probably aids in emergence from the cocoon and movement in the soil. It seems unlikely that it is unique to *P. habrosana*, and it may be characteristic of all species of *Pseudexentera*. The first six abdominal segments are armed with two dorsal rows of short, stout spines; the eighth and ninth segments bear about six heavy triangular spurs; and the cremaster is simple, consisting primarily of two lateral, triangular projections, a type which seems to be typical of Tortricid pupae which anchor in the soil.

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A NEW SPECIES OF TETRALONIA FROM THE DESERTS OF CALIFORNIA AND NEVADA

(Hymenoptera: Apoidea)

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The following species is described at this time to provide a name for a bee that figures prominently in the pollination of *Oenothera*, and on which Drs. Linsley and MacSwain wish to publish their observations.

Tetralonia venusta Timberlake, new species

This is a remarkably distinct and isolated species. It differs from usual species in the minutely and densely punctured head and thorax, densely clothed with pale pubescence, more or less fulvous dorsally, in the fine and unusually close-set scopal hair of hind tibiae and basitarsi, in the light-colored, short, thin maxillary palpi and in the cuneate pygidium, with a broad low median ridge. The female is also remarkable for the wide variation in the color pattern of the abdomen. The male is distinctive in having the sixth ventral segment well rounded at apex, with a strong, oblique crista on each side, the subgenital plate with a deep, rounded median notch, and tergite seven with a narrowly cuneate pygidiform area.

Female.—Black, the mandibles generally with a fulvous mark before the apex, flagellum of antennae somewhat brownish beneath, tegulae pale ferruginous, tibial spurs brownish testaceous and small joints of tarsi more or less brown. Wings grayish dusky, the nervures fuscous. Pubescence of head and thorax very dense and fine, concealing the surface of mesonotum, a little longer and less dense on cheeks and underparts of thorax, moderately dense across the middle of face, usually more or less bright fulvous but